



STORED PROGRAM INTEGRATED DATA ACQUISITION REDUCTION (SPIDAR) CONCEPT

Technical Measurement Corporation's position as a leading manufacturer of nuclear pulse height analyzer systems with capacities of 4096 and 16,384 channels has long been recognized. Equally evident has been the superior performance and versatile display capability possessed by TMC's 4096 modularized multi-parameter analysis system. With this system, the user can select the appropriate logic units together with the channel capacity, display and output equipment best suited to his experimental needs. The underlying concept has been growth potential and expandability through additional modular options. Now TMC announces that a new capability has been developed in the form of an interface unit that will eliminate the data reduction barrier that concerned new customers of hard-wired, pulse-height or time-of-flight analyzers. Named SPIDAR (Stored Program Integrated Data Acquisition Reduction system), the TMC 4096-channel capacity system is now capable of direct communication with a general-purpose digital computer memory by bilateral data transfer. Sequential data transfer from any selected location in the analyzer memory to an arbitrary last location may proceed at rates up to 50kc in either direction. The full 20-bit word is transferred in parallel. Furthermore, the control functions of the analyzer are also automatically programmable—that is, the analyzer mode may be switched from accumulate to display or to stop, etc., by external command of the computer. An important added feature is that data from the ADC may be transferred to the computer memory directly, as well as to the analyzer memory, for buffering of raw data on magnetic tape. A more detailed functional description of the enhanced capability provided by SPIDAR will be brought into sharper focus against the background of the over-all system capabilities and specifications.

INPUT UNITS:

The input units consist of the high quality logic plug-in units and one or more TMC Model 242 Two-Parameter Input Units for multi-parameter applications. The logic units may be selected from a complete list of available plug-in units consisting of the following:

TMC Model 210 Pulse Height Logic Unit—

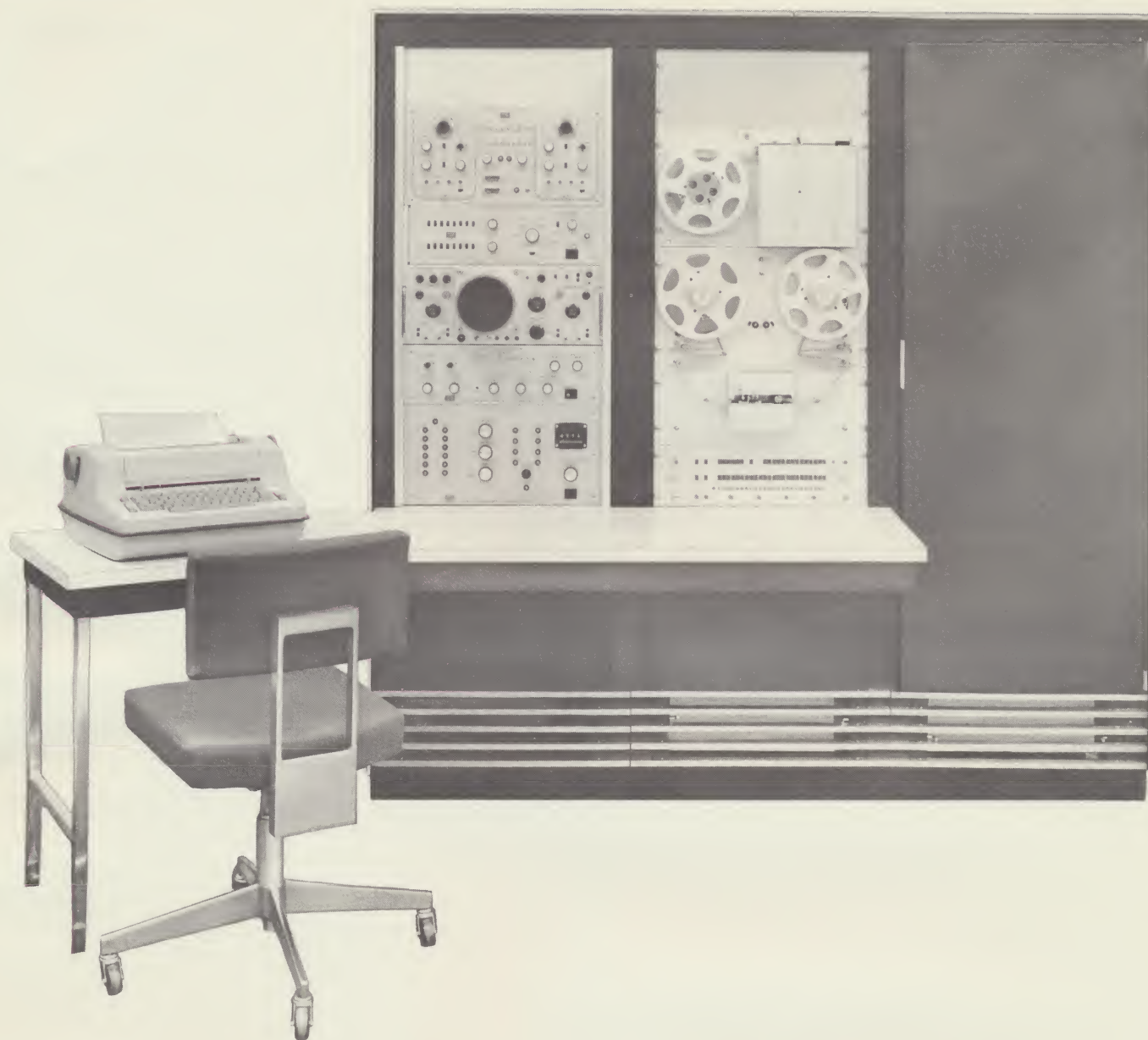
For high level and low level pulse height conversion through ten digital bits.

TMC Model 213 Pulse Height Logic Unit with 4 Inputs—

Similar to 210 for high level, four-inputs with routing

TMC Models 201, 211—Time-of-Flight Logic Units.

TMC Model 204—Spectrum Multi-scale Logic Unit.



STORED PROGRAM INTEGRATED DATA ACQUISITION REDUCTION
(SPIDAR) SYSTEM



The results of the analog-to-digital conversion are stored in the registers of the Model 242, each of which has provision for accepting two logic plug-in units. The transfer of the data from the Model 242 can be performed automatically as soon as conversion is complete or after a fixed time duration following the longest conversion. Transfer of the address data may take place to the computer's external input lines under computer control, or to the analyzer memory via the Model 244 Format Selector. The Model 242 output may be monitored directly on an oscilloscope since the unit contains appropriate digital-to-analog converters, thus allowing display of the full 1024 x 1024 matrix.

The TMC Model 442—Time-of-Flight Rack Mounted Module may be used without the need for the Model 242 Unit.

FORMAT CONTROL:

The Model 244 Format Selector is able to select various combinations of the 12 bits from the 20-bit buffer register of the Model 242, and form an address to be transferred to the memory. Both single parameter and multi-parameter modes of operation are provided. The transfer of Model 244 output directly to a computer from this unit is also allowed.

DISPLAY PLOT CONTROL UNIT:

TMC Model 438 Display Plot Control is available with this system and provides an analog voltage proportional to the data stored in the analyzer memory for display on an oscilloscope or for output to an X-Y plotter. The display is "live" during data accumulation into the analyzer. The flexibility built into this unit makes a wide variety of display configurations possible. Three types of displays for accumulated data are available. They are:

1. *Slice Display:* In slice display a number of consecutive slices are presented.
2. *Isometric Display:* When the horizontal and vertical slice displacement controls are advanced, the effect is a three-dimensional perspective view of the stored data.
3. *Contour Display:* Counts stored in the display channels are represented by spot intensity versus horizontal and vertical axes. Only the channels containing counts within a selected storage level will be visible on the system's CRT.

Variations of these basic display modes can be made by front panel control adjustments. By transferring reduced data from the computer to the analyzer memory, raw and reduced or calculated data may be simultaneously observed on the oscilloscope.



MEMORY:

The heart of the SPIDAR system is a fixed-wired, coincidence current, random access memory of 4096 words, each 20 bits (5 decades) in length. The cycle time in the spectrum accumulate mode of operation is 13 microseconds. During this time a complete read, data increment and rewrite is performed with the address data supplied by the Model 244 unit. The memory can be used for storage of low resolution multi-input experiments in a number of configurations such as 64 x 64, 128 x 32, 256 x 16, etc. Alternately, it will store multi-input, high resolution data when required. Data being read into the memory from external devices can be added or subtracted from the memory contents, thereby providing an algebraic summing feature. It can also store program or computer data after receiving it from the computer. Its contents are available to the computer by way of the interface unit. Similarly, stored data in this memory may be displayed on an oscilloscope by the appropriate display unit, Model 438.

INTERFACE UNIT:

This unit provides the enhanced capability that permits integration of data acquisition with data reduction capabilities. Its functions include:

1. Recognition of computer signals to enable the communication link.
2. Selection by the computer of the memory address and memory information register for transfer of data.
3. Selection of external devices for data transfer into the computer.
4. Transfer of address information from the computer to the analyzer.
5. Transfer of 20 bits of data information from the computer.
6. Transfer of 20 bits of data from the analyzer to the computer.
7. Accepting control commands from the computer and performing the appropriate control function of the analyzer system.
8. Tests to see whether the unit or external devices are busy and supplies a signal to that effect.

(Any one or more of these operations may be performed sequentially under program control.)

OUTPUT FACILITIES:

A number of output facilities are provided for use with the basic system. These include:

1. *The Control Unit, TMC Model 437*, together with the Model 222 Dual Live Timer, have the ability to drive a high speed line printer. This output can be used to extract the contents of the memory on a permanent record.
2. *TMC Model 525/2020, Tape Control Unit*, permits the system to write the memory contents onto magnetic tape in an IBM-compatible format. Search and playback are also included.
3. *The Model 520RA Unit*, which is able to drive a punched paper tape system and an electric typewriter.



IN SUMMARY:

The SPIDAR data acquisition and reduction system combines the best features of the conventional multi-parameter analyzer and the on-line stored program computer.

SPIDAR provides for a wide variety of different types of input experimental data through replaceable input logic, sorting and routing units.

SPIDAR accepts and digitizes data in a short period of time as compared to the data storage speed of the entire system.

SPIDAR reduces and condenses data in real operating time.

SPIDAR stores raw or reduced data at the maximum counting rates usually encountered.

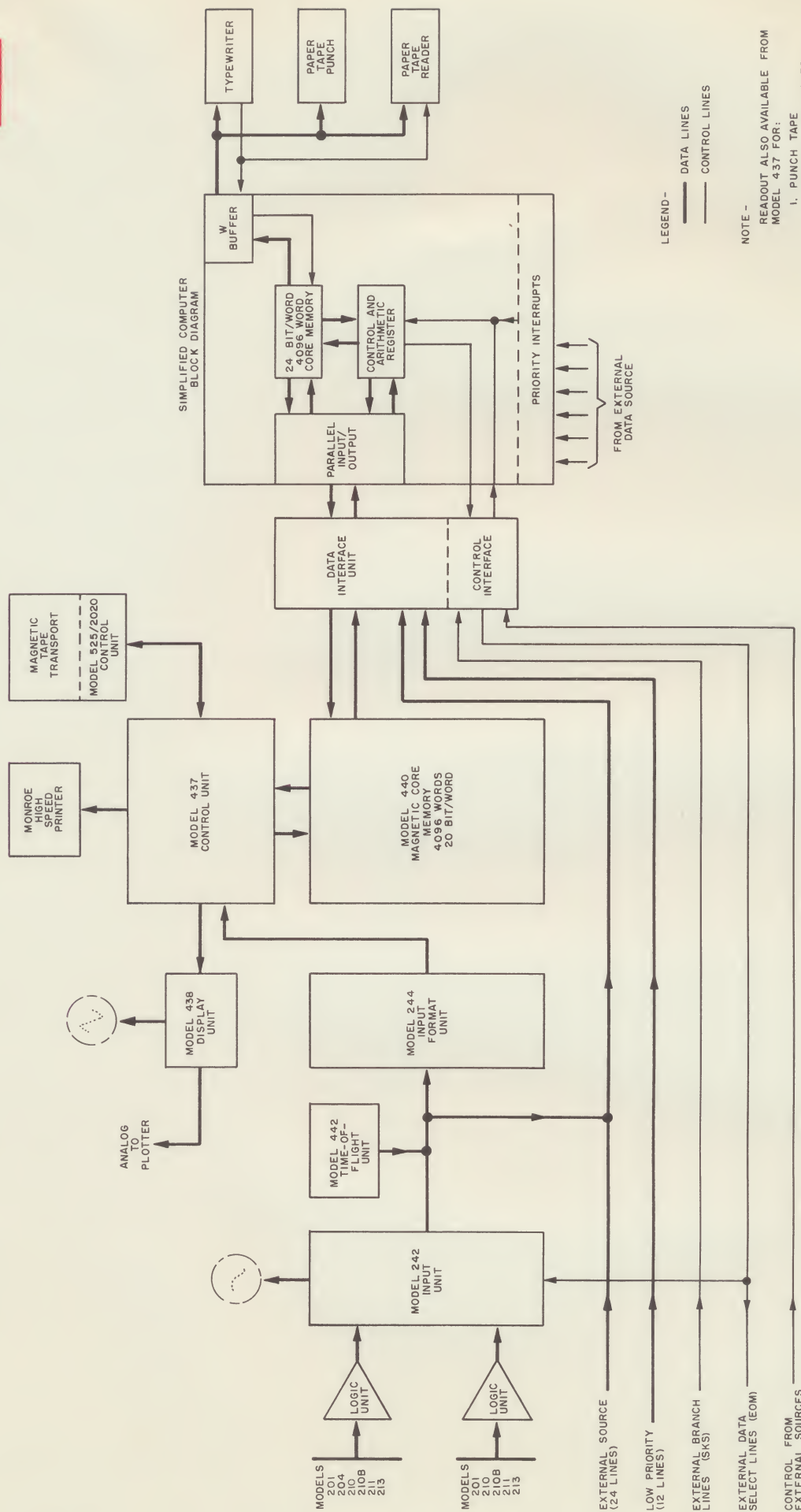
SPIDAR displays incoming, accumulated, or reduced data.

SPIDAR provides the flexibility to serve the wide variety of present experimental needs and expansion capability so that the system may be modified and extended to serve the changing experimental needs of the future.

SPIDAR provides records of raw, reduced and analyzed data to the experimenter.

SPIDAR permits simultaneous off-line computation if further reduction is necessary.

The SPIDAR system has a place in your research program. The Technical Measurement Corporation of North Haven, Connecticut, awaits the opportunity to discuss your needs, establish feasibility, and fulfill your particular requirements.



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NOTE -
READOUT ALSO AVAILABLE FROM
MODEL 437 FOR:
1. PUNCH TAPE
2. PAPER TAPE READER
3. TYPEWRITER



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